

# *406 and 121.5 for Search and Rescue*

*Understanding new and old Search and Rescue frequencies.*



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*The worldwide conversion to 406 MHz for locating distress beacons has led to some confusion over the future of 121.5/243 and its role in search and rescue efforts. The purpose of this whitepaper is to shed some light on the benefits of 406 MHz, 121 MHz and how the two work in concert for the fastest search and rescue results.*

## ***Satellite Monitoring***

*Effective February 1<sup>st</sup>, 2009 the International COSPAS-SARSAT Program terminated satellite processing of all 121.5/243 MHz distress beacons<sup>1</sup>. Aviators, mariners and individuals who depend upon distress beacons have been strongly urged and in some cases (maritime) required to transition to distress beacons transmitting on the new emergency frequency—406 MHz if they want to be detected by the COSPAS-SARSAT satellite system in the case of an emergency.*

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<sup>1</sup> Distress beacons include emergency locator transmitters (ELT) for aircraft, emergency position-indicating radio beacons (EPIRBs) used on boats, and personal locator beacons (PLBs) used by land-based individuals.

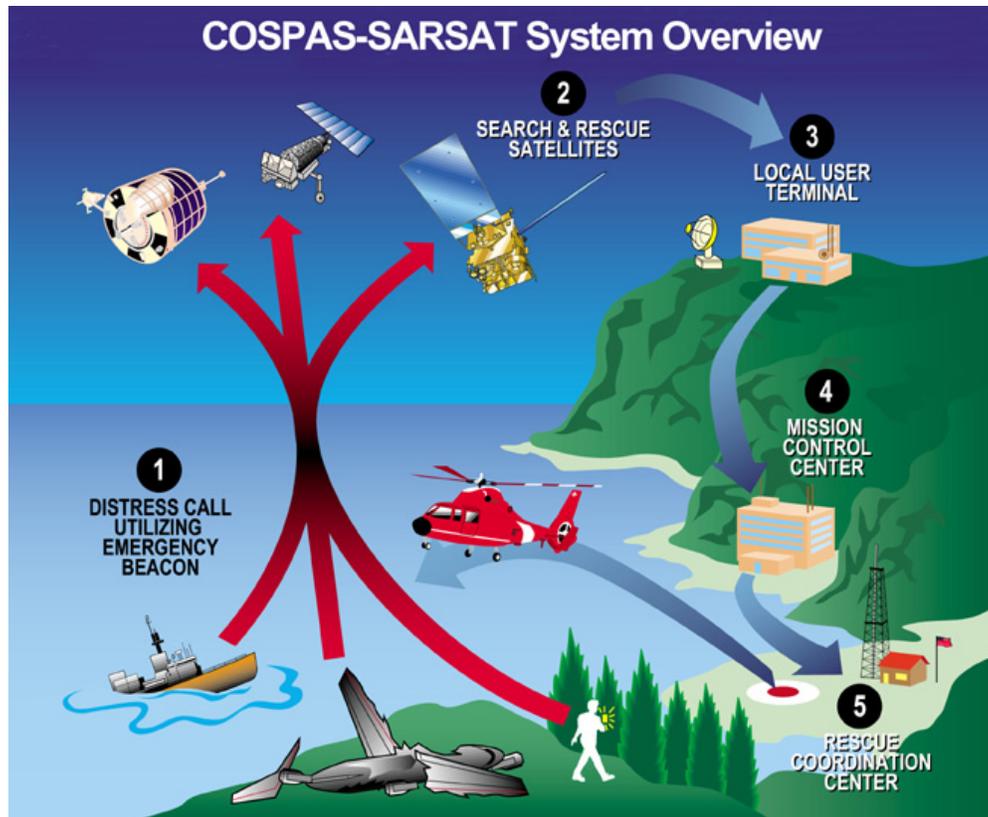
## ***The Benefits of 406 MHz***

*The decision to switch to 406 MHz beacons is the result of various factors. In contrast to the previous 121.5/243 MHz beacons that transmitted anonymously (satellites could not determine if an alert was from a distress beacon or a non-beacon source), the 406 MHz beacons transmit digital coded signals. The COSPAS-SARSAT satellite system will only be able to process the coded data signals thereby rejecting all other non-distress signals.*

*In addition to this distinction, all 406 MHz beacons are required by law to be registered with National Oceanic and Atmospheric Administration. Beacon registration includes the beacon owner's contact information which allows the majority of false alarms to be resolved by a simple phone or radio call to the registered POC prior to any launch of SAR assets.*

*Furthermore, because of the efficiency of the 406 MHz beacons, SAR assets are able to respond more quickly due to an increase in confidence in the event of an alert. This is a vast improvement over the previous dependency on additional alert information or verification needed before SAR assets could be dispatched.*

## How SAR Assets are Deployed in an Emergency



*How 406 and 121.5 are used for SAR 1*

Figure 1: Graphic and content courtesy of NASA and NOAA

- 1. In situations of "grave and imminent danger" when lives are at risk, emergency beacons are activated.*
- 2. Emergency alerts received by the satellites are retransmitted to 38 automatic (unstaffed) ground stations worldwide. These stations are called Local User Terminals (LUTs).*
- 3. Alerts are routed to a Mission Control Center (MCC) in the country that operates the LUT. Routed messages include beacon location computed at the LUT if the message is received by one of the system's satellites. Alerts received by system*

satellites in can include location information if the beacon is a self-locating type (using GPS or onboard navigation).

4. After validation processing, alerts are relayed depending on beacon location or country of registration (406 MHz beacons only) to either another MCC or to the appropriate Rescue Coordination Center (RCC).

5. RCC deploys the appropriate Assets to locate and rescue individuals at the emergency location.

### ***The Continued Need for 121.5/243 MHz***

*Although the 406 MHz beacons are superior in terms of alert efficiency and accuracy, for distress beacons not equipped with GPS, there remains a need for the 121.5/243 MHz analog component.*

*Once verified, a 406 MHz beacon's position can be narrowed down to approximately a 20 square mile area. When SAR assets respond to the initial search area the 406 MHz becomes problematic in terms of target location because of its transmission rate. The 406 MHz digital signal transmits once every 50 seconds versus the 121.5/243 MHz analog signal that transmits continuously. This difference makes the 406 MHz signal virtually impossible for SAR assets to track and pinpoint.*



***Defined search area using 406 and 121.5. 1***

***Figure 2: Whereas SAR Assets had a very large initial search area under the old 121.5/243 system, 406 has greatly narrowed the area down. Once Assets arrive in the area identified by the 406 beacon, 121.5/243 allows them to quickly pinpoint the exact location of the distress call. The combination of the two provides the quickest response possible***

*The combined 406 MHz and 121.5/243 MHz system offers the ultimate solution. The analog 121.5/243 MHz component provides a continuous transmission that enables SAR assets to home in on the beacon's location.*

*When paired together, the digital signal carries a code identifying and verifying the beacon's transmission and initial location, while the analog signal enables SAR assets to quickly and efficiently locate the beacon.*

## **Footnotes**

*More information on Tracker SAR systems available at [www.trackersecurity.com](http://www.trackersecurity.com)*

*Contact Tracker Security at (208)514-4719 or [sales@trackersecurity.com](mailto:sales@trackersecurity.com)*

## **About Tracker Security**

*Tracker Security is a solution/technology provider that offers "state of the art" tracking and monitoring solutions of people or high value items to B2B and B2G customers. Tracker's handheld FTV receiver was designed for tracking 121.5/243 MHz transmissions by ELTs, EPIRBs and other distress beacons. Folding to the size of a flashlight, the FTV is lightweight, small and easy to use in recovery missions.*